STRATEGY FOR RECOVERY

A core area represents the closest approximation of a biologically functioning unit for bull trout. The combination of core habitat (*i.e.*, habitat that could supply all elements for the long-term security of bull trout, including for both spawning and rearing, as well as for foraging, migrating, and overwintering) and a core population (*i.e.*, bull trout inhabiting core habitat) constitutes the basic core area upon which to gauge recovery within a recovery unit.

When we apply the core area concept to the Kootenai River Recovery Unit (Table 2), core areas are most easily delineated for adfluvial populations in Lake Koocanusa, Bull Lake, and Sophie Lake (*e.g.*, typically the lake where adults reside and the interconnected watershed upstream, although Bull Lake presents an exception). For the migratory population of the Kootenai River, evidence indicates connectivity exists within the system from Libby Dam all the way downstream to Kootenay Lake; hence, this area represents a single core area.

Table 2. List of local populations (in bold) by core area, in the Kootenai River Recovery Unit. Streams designated by (mc) are migratory corridors only, and are not considered to host their own local population.

CORE AREA	LOCAL POPULATION
Lake Koocanusa	Kootenai River (mc) **Wigwam River** (BC and MT) Tobacco River (mc) **Grave Creek** BC tributaries - Unspecified[1]
Sophie Lake	**Phillips Creek** upstream of Sophie Lake

[1] Distribution and abundance of local populations of bull trout in most watersheds in Idaho is poorly known at this time. For Idaho tributaries that are unspecified, no redds were observed in searches conducted in 1999 or 2000, and juvenile bull trout have rarely been encountered during electrofishing surveys. Continued survey may indicate the need for substantial changes to this list of local populations.

Table 2. List of local populations (in bold) by core area, in the Kootenai River Recovery Unit. Streams designated by (mc) are migratory corridors only, and are not considered to host their own local population.

CORE AREA	LOCAL POPULATION
Kootenai River (MT/ID/BC) and Kootenay Lake (BC)	Kootenai River (mc) **Fisher River** **Libby Creek** **Pipe Creek** **Quartz Creek** **O'Brien Creek** **Callahan Creek** ID tributaries - Unspecified BC tributaries - Unspecified
Bull Lake	Lake Creek (mc downstream) **Keeler Creek**

Recovery Goals and Objectives

The goal of the Bull Trout Recovery Plan is to **ensure the long-term persistence of self-sustaining, complex, interacting groups of bull trout distributed throughout the species native range. Specifically, the Kootenai River Recovery Unit Team adopted the goal of a net increase in bull trout abundance in this recovery unit (as measured by standards the recovery team develops), with restored distribution of any extirpated populations that the recovery unit team identified as necessary to recovery**. In order to recover bull trout in the Kootenai River, the following objectives need to be met:

- Maintain current distribution of bull trout and restore distribution in previously occupied areas within the Kootenai River Recovery Unit.

- Maintain stable or increasing trends in abundance of bull trout in the Kootenai River Recovery Unit.

- Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.

- Conserve genetic diversity and provide opportunity for genetic exchange.

A primary concern is the need for a more formal working relationship between Montana, Idaho, and British Columbia in addressing bull trout restoration in the Kootenai River drainage. Because the local bull trout populations in this drainage are comprised mostly of migratory fish, often originating in Canada, coordination with these jurisdictions is essential to achieve recovery. This point cannot be overemphasized.

Bull trout are distributed among at least 10 local populations within 4 core areas of the Kootenai River Recovery Unit located wholly or partly in the United States (see Table 2). Spawning and rearing habitat for many (probably most) of the local populations of bull trout in the Kootenai River drainage is in British Columbia and so outside the jurisdiction of this recovery plan. Local populations in Canada are currently being studied, and at least three are being monitored. As more distribution and genetic information is developed, the number of local populations identified is likely to increase. In the Kootenai River Recovery Unit within the United States, the historical distribution of bull trout is not well documented, but is believed to be relatively intact. There are no areas at this time where reestablishment of extirpated local populations is recommended. Rather, the emphasis is being placed on securing the existing distribution, increasing the abundance and connectivity of local populations, and coordinating with Canadian entities.

Recovery Criteria

In order to assess progress toward the objectives, the recovery unit team adopted recovery criteria, described below. Numerical standards used to determine the recovered abundance of bull trout in the Kootenai River Recovery Unit are presented in Table 3.

Of the 4 core areas identified in the Kootenai River Recovery Unit, only the 2 main populations have the potential to reach the level of 1,000 spawning adults proposed by Rieman and Allendorf (2001) as a cautious management goal for long-term maintenance of genetic variation in a core area population. Using in part the analysis of Rieman and Allendorf (2001), the recovery unit team assumed that a core area cannot maintain genetic viability (even for the short term) with spawning populations of fewer than about 100 adults. There are inherent stochastic as well as genetic risks associated with low population levels. Rieman and Allendorf (2001) concluded that a cautious interpretation would require approximately 100 adults, spawning each year, to minimize the risk of inbreeding. Numerical criteria we present for replication of populations and adult abundance (Table 3) are estimates of the minimum population levels required for recovery based on current knowledge. As data are collected and trends are more clearly documented, these numbers should be refined for application as recovery criteria.

As per the objectives identified in Chapter 1, the intent within this recovery unit is to maximize likelihood of persistence. This intent will be achieved, in part, by seeking to perpetuate the current distribution and maintaining or increasing abundance of all local bull trout populations that are currently identified or will be identified in the future in the Kootenai River Recovery Unit (Table 2). Numerical summary of the recovery criteria is presented in Table 3. In this recovery unit, a distinction was made between two types of core areas, a distinction based mostly on the size, connectedness, and complexity of the watersheds.

Primary Core Areas: Primary core areas are typically located in watersheds of major river systems, often contain large lakes or reservoirs, and have migratory corridors that usually extend 50 to100 kilometers (31 to 62 miles) or more. Each primary core area includes several identified local populations of bull trout. In recovered condition, a primary core area is expected to support at least 5 local populations with 100 or more spawning adults and contain 1,000 or more adult bull trout. Lake Koocanusa and the Kootenai River/Kootenay Lake complex have been designated as primary core areas, representing recovered status in the Kootenai River Recovery Unit

Table 3. Numeric standards necessary to recover abundance of bull trout in primary and secondary core areas of the Kootenai River Recovery Unit of the Columbia River drainage.

CORE AREAS	Existing Number (Estimated) Local Populations (United States)	Existing Number (Estimated) Local Populations with > 100 (United States)	Recovered Minimum Number Local Populations with > 100 (United States)	Recovered Minimum Number Core Area Total Adult Abundance
Lake Koocanusa[2]	2	2	2	1,000
Kootenai River/ Kootenay Lake	6	1-4	5	1,000
Bull Lake	1	1	1	100
Sophie Lake	1	0	1	100

Secondary Core Areas: Secondary core areas are based in smaller watersheds and typically contain adfluvial populations of bull trout that are naturally isolated and have restricted spawning and rearing habitat extending only a few kilometers. This spawning and rearing habitat is normally upstream of the lake. As has been noted, Bull Lake is an exception, with most of the spawning and rearing occurring primarily in Keeler Creek downstream of the lake. Secondary core areas in the Kootenai River Recovery Unit are Bull Lake and Sophie Lake. They each include one identified local population of bull trout. Neither Bull Lake nor Sophie Lake is in a watershed of sufficient size and complexity to accommodate the 5 or more local populations of bull trout required to meet the abundance criteria (defined above) for primary core areas. The conditions isolating Bull Lake and Sophie Lake are natural, and it is believed that

[2] At least 3 local populations in the Lake Koocanusa core area, with 100 or more adults in each, are thought to exist wholly or partly in Canada. Pending additional evaluation, that number could increase. While the populations are outside the United States (except for the Wigwam River), they must be considered the primary source of recruitment to Lake Koocanusa, therefore contribute to adult abundance in the core area.

in most such situations bull trout have existed for thousands of years and despite numbers that may have seldom exceeded 100 adult fish.

The distinction between primary and secondary core areas is made not to infer a different level of importance for recovery purposes, but to indicate that a different set of standards are needed for recovery criteria, in particular for addressing abundance. The bull trout in the Bull Lake core area are known to express a unique phenotypic trait (*i.e.*, downstream spawning), and bull trout in the closed basin of Sophie Lake also represent a unique resource in the Kootenai River Recovery Unit. Perpetuating both populations is a high priority in this recovery unit.

For the portions of these watersheds in Montana, the primary core areas are functionally equivalent to the Restoration/Conservation Areas designated by the Montana Bull Trout Restoration Team (MBTRT 2000). The secondary core areas generally represent the waters referred to as "disjunct" by the Montana Bull Trout Scientific Group.

Achieving the following recovery criteria, including increased monitoring and evaluation, will require the cooperative efforts of State, Federal, and Tribal resource management agencies; government and private landowners and water users; conservation organizations; and other interested parties. These recovery criteria will only be achieved through the reduction of threats to bull trout, in part as a result of implementing tasks identified in the recovery measures narrative of this recovery plan, as well as by taking advantage of other new conservation and recovery opportunities as they arise. The Kootenai River Recovery Unit will be considered recovered (*i.e.*, the threat of extinction removed) when the following specific criteria are met:

1. **Distribution criteria will be met when the total number of identified local populations (currently numbering 10 in United States waters) has been maintained or increased, and local populations remain broadly distributed in all four existing core areas (Table 2).** This criteria must be applied with enough flexibility to allow for adaptive changes in the list of local populations (both additions and subtractions), based on best available science, as the body of knowledge concerning population and genetic inventory grows.

The distribution criteria cannot be met if major gaps develop in the current distribution of bull trout in the core areas of the Kootenai River Recovery Unit within the United States. Reconnecting fragmented habitat, as well as documenting new or previously undescribed local populations, should allow the distribution of bull trout to increase as recovery progresses. We recognize that stochastic events or deterministic processes already occurring could negatively affect distribution in some cases. The significance of such losses in distribution in ultimately determining whether or not distribution criteria have been met needs to be judged on a case-by-case basis. Maintaining the distribution of bull trout in the British Columbia portion of these watersheds is equally essential, though not covered under the jurisdiction of this plan.

2a. **Abundance criteria will be met in the primary Lake Koocanusa and Kootenai River/Kootenay Lake core areas when each are documented to host at least 5 local populations (including British Columbia tributaries) with 100 adults in each, and each of these primary core areas contains at least 1,000 adult bull trout.**

The abundance criteria for the Bull Lake and Sophie Lake secondary core areas will be met when each core area supports at least 1 local population of bull trout containing 100 or more adult fish.

In the United States waters of the Lake Koocanusa core area, only Grave Creek (and tributaries) and the upper portion of the Wigwam River (lower portion is in British Columbia) support bull trout spawning. Redd counts in Grave Creek ranged from 35 to 134 in 1996 through 2000, indicating a local population of at least 100 spawning adults. This population is the only local 1 capable of reaching that standard of 100 spawning adults in the United States. The Wigwam River supports a few bull trout redds in the upper (*i.e.*, United States) stream reach (6 in 1998 and 21 in 1999), but depends on migration through Canadian tributaries. For recovery purposes, the Wigwam River is considered one local population regardless of political jurisdiction. Redd counts in the Wigwam River in British Columbia ranged from 524 to 1,496 in 1996 through 2001 (Westover, *in litt*., 2001a, 2001b), indicating that the total population of adult bull trout in Lake Koocanusa is well over 1,000 adults and is probably increasing. Significant spawning runs occur in Skookumchuck Creek and

other British Columbia tributaries, but they are largely unquantified. To satisfy abundance criteria, continuing international cooperation will be necessary to verify that additional local populations with 100 or more adults exist in other British Columbia tributaries.

In the Kootenai river portion of the Kootenai River /Kootenay Lake core area, there are currently six identified local populations of bull trout, all in Montana (Table 2). Redd counts indicate that the local population exceeds 100 adults in the strongest population, which is in Quartz Creek, where 47 to 105 redds were counted annually since 1996. In Pipe Creek (17 to 36), Libby Creek (10 to 36), and O'Brien Creek (12 to 47), adult numbers may be approaching the level of 100 fish. But to verify the status of these local populations, additional information is needed to determine spawning frequency (annual vs. intermittent) and the number of adults per redd. Redd counts are incomplete for other watersheds, such as the Fisher River and Callahan Creek, but those streams have the potential to support local populations with over 100 spawning adult bull trout. At this time, it is believed that this core area is comprised primarily of fluvial fish, with perhaps a minor component of adfluvial migrants from Kootenay Lake. With expanded monitoring and additional removal of threats, this core area could probably meet recovered abundance criteria.

There is no evidence that spawning populations of bull trout in other portions of the Kootenay Lake watershed in British Columbia (such as those that pass through the Duncan Dam) interact with the Kootenai River populations (Olmsted *et al.* 2001). At this time, we will not evaluate those populations nor include them under this recovery plan because the lake and spawning tributaries are entirely in Canada. However, conditions in Kootenay Lake that affect all populations of bull trout are important to the potential for recovery of bull trout in this core area in the United States.

The abundance criteria for primary core areas of 5 local populations, each with 100 spawning adults and 1,000 or more adult fish, is designed to protect genetic integrity and to reduce chances of stochastic extirpation by replicating local populations in these core areas. Much of the spawning and rearing habitat for these core areas, particularly for Lake Koocanusa, is in British Columbia. The location

makes satisfying the recovery criteria somewhat problematic since the Endangered Species Act protections for bull trout do not apply in Canada. However, it is important that these core areas be treated as continuous ecosystems, despite political boundaries. To expect full recovery to occur in these two core areas without strong international cooperation is not realistic. As more information becomes available, the default criteria for each primary core area should be evaluated and may be adjusted to reflect that new information. We emphasize that these criteria must be adaptive if we are to fully protect and restore bull trout in this recovery unit.

2b. **The abundance criteria for the Bull Lake and Sophie Lake secondary core areas will be met when each core area supports at least 1 local population of bull trout containing 100 or more adult fish.**

It is questionable whether Sophie Lake and its tributary, Phillips Creek, have sufficient habitat available to meet this criteria, even in a recovered condition. This situation must be factored into the ultimate evaluation of whether or not the criteria have been attained.

For the Bull Lake core area, redd counts of Keeler Creek (1996 to 2000) were from 59 to 99 redds each year, indicating that the recovery criteria is being met. For the Sophie Lake core area, no redd count data are available. Monitoring will need to be a priority if the criteria are to be achieved.

3. **Trend criteria will be met when the overall bull trout population in the Kootenai River Recovery Unit is accepted, under contemporary standards of the time, as stable or increasing, based on at least 10 years of monitoring data**.

For the Lake Koocanusa core area, this criteria includes all local populations spawning in the United States or British Columbia. For the Kootenai River/Kootenay Lake core area, this criteria includes only the Kootenai River populations. The reason for the differential treatment is that in the latter case many of the Kootenay Lake bull trout spend their entire life cycle in Canada, while in the case of Lake Koocanusa it is believed most of the fish spend at least part of their life cycle in United States waters.

4. **Connectivity criteria will be met when dam operational issues are satisfactorily addressed at Libby Dam (as identified through U.S. Fish and Wildlife Service Biological Opinions) and when over half of the existing passage barriers identified as inhibiting bull trout migration on smaller streams within the Kootenai River Recovery Unit have been remedied.**

In the Kootenai River Recovery Unit, substantial gains in reconnecting fragmented habitat may be achieved by restoring passage over and around many of the barriers that are typically located on smaller streams, including water diversions, road crossings, and culverts. These barriers are not listed individually in the recovery criteria. In fact, many have not been identified, but there is a recovery task directed at doing so in the first 5 years of implementation of this plan. These passage barriers may collectively be very important to recovery. Substantial progress must be made in providing passage over at least half of these sites, consistent with the protection of upstream populations of westslope cutthroat trout and other native fishes, in order to meet the bull trout recovery criteria for connectivity.

A delisting determination can only be made on a "listable entity." Listable entities include species, subspecies, or distinct population segments of any species or vertebrate fish or wildlife that interbreeds when mature. Criteria for applying the definition of distinct population segment are found in the joint U.S. Fish and Wildlife Service and National Marine Fisheries Service "Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act" (61 FR 4722). Currently, the rules that listed the Klamath River, Columbia River, Jarbidge River, Coastal Puget-Sound, and St. Mary-Belly River bull trout as threatened, establish those populations as distinct population segments. Subsets of those populations would have to be shown to meet the definition of distinct population segment before the U.S. Fish and Wildlife Service could propose delisting those populations or groups of populations. Reclassifying the Kootenai River, or a group of headwater streams including the Kootenai river, as a separate distinct population segment may be appropriate given that recent genetic evidence suggests that these waters may meet criteria for distinctness.

RECOVERY MEASURES NARRATIVE

The recovery measures narrative consists of a hierarchical listing of actions following a standard template in this chapter and all other chapters of the Bull Trout Recovery Plan. The first- and second-tier entries are identical among all chapters and represent general recovery tasks under which specific tasks appear as third-tier entries, where appropriate. Third-tier entries are tasks specific to the Kootenai River Recovery Unit, appear in the Implementation Schedule following this section of the chapter, and are identified by three numerals separated by periods. Second-tier tasks that do not include specific third-tier actions are either 1) programmatic activities that are applicable across the range of the species (see Chapter 1) and appear in *italicized font* or 2) tasks that may not be sufficiently developed to apply to this recovery unit at this time and appear *in an italicized font that is shaded (as seen here).* These tasks are included to preserve consistency in task numbering among recovery unit chapters and to assist in generating information during the comment period for the draft, a period during which additional tasks may be developed.

The Kootenai River Recovery Unit Chapter should be updated or revised as recovery tasks are accomplished or as environmental conditions change and monitoring results or additional information become available. The Kootenai River Recovery Unit team should meet annually to review annual monitoring reports and summaries and to make recommendations to the U.S. Fish and Wildlife Service.

1 Protect, restore, and maintain suitable habitat conditions for bull trout.

1.1 Maintain or improve water quality in bull trout core areas or potential core habitat.

1.1.1 Reduce general sediment sources. Stabilize roads, crossings, and other sources of sediment delivery. Potential sites include **Idaho**: Boundary Creek (Idaho and British Columbia), Callahan Creek (Idaho and Montana), Deep Creek, and Long Canyon Creek; **Montana:** Fisher River, Fortine Creek, Grave Creek and tributaries. (Blue Sky, Clarence, and Lewis creeks),

Keeler Creek, Libby Creek, O'Brien Creek, Quartz Creek, and Wigwam River (Montana and British Columbia).

1.1.2 Upgrade problem roads. Pave, upgrade, or relocate portions of major access roads, including those along Fisher River, Grave Creek, and Libby Creek in **Montana**, to reduce impacts from sediment and remedy extensive floodplain encroachment and channel alterations.

1.1.3 Clean up mine waste. Control mining runoff by removing or stabilizing mine tailings and waste rock formerly deposited in the stream channel and floodplain of **Idaho:** Blue Joe Creek, and Boulder Creek and of **Montana:** Lake Creek, Libby Creek, and Stanley Creek. Evaluate and monitor additional concerns about potential sediment and leaching from Canadian mines (British Columbia) and about Montenore Mine activities on Libby Creek (Montana).

1.1.4 Support habitat protection and monitoring in British Columbia. Work collaboratively with British Columbia Ministry of Water, Land, and Air Protection and other Canadian governmental and nongovernmental entities to ensure bull trout habitat is protected and enhanced in the Kootenai River watershed upstream of Lake Koocanusa and in Kootenay Lake and its tributaries downstream of the United States. Continue habitat and fishery monitoring efforts (*e.g.*, redd counts in Wigwam River and Skookumchuck Creek; catch and harvest surveys in Kootenay Lake, Kootenay River, and Elk River.)

1.1.5 Restore Boundary Creek. Reclaim unstable and currently inaccessible forest access road up Boundary Creek (Idaho) and evaluate potential to restore access via other, more stable routes.

1.1.6 Conduct Fisher River assessment. Conduct thorough sediment source and channel stability survey (watershed analysis) in the Fisher River (Montana) watershed and implement corrective actions.

1.1.7 Monitor Wigwam River timber harvest. Evaluate, monitor, and comment as appropriate to British Columbia and United States authorities on the Crestbrook Forest Industries (TEMBEC) Timber Harvest Plan in the Wigwam River drainage. Concerns include potential sedimentation and effects on watershed integrity from timber harvest, roads and crossings, and increased (controlled) access to the most important bull trout spawning stream in the upper Kootenai River watershed.

1.1.8 Assess and minimize threats from Skookumchuck pulp mill landfill closure. Support British Columbia efforts to ensure that the hazardous materials buried in this landfill are sufficiently isolated from the floodplain to ensure minimal risk to the river and aquatic habitat.

1.2 Identify barriers or sites of entrainment for bull trout and implement tasks to provide passage and eliminate entrainment.

1.2.1 Eliminate entrainment in diversions. Identify potential loss of fish in diversions and screen water diversions and irrigation ditches identified as high priority by watershed groups (*e.g.*, Glen Lake Irrigation Diversion on Grave Creek [Montana] and Boundary Creek [Idaho]).

1.2.2 Provide fish passage around diversions. Install appropriate fish passage structures around diversions on bull trout streams and/or remove related migration barriers in **Montana:** Grave Creek, O'Brien Creek (Troy Diversion), and Quartz Creek (near

FS Rd. 399); **Idaho:** Boundary Creek, Myrtle Creek, and others as identified.

1.2.3 Eliminate culvert barriers. Monitor road crossings for blockages to upstream passage and replace existing culverts that impede passage in **Idaho:** Caboose Creek (railroad), Cow Creek, Debt Creek (railroad), and others as necessary.

1.2.4 Improve instream flows. Restore connectivity and opportunities for migration by securing or improving instream flows and acquiring water rights from willing sellers; priority streams identified to date in **Montana:** Callahan Creek, Keeler Creek (upper), Libby Creek, and O'Brien Creek; **Idaho:** Boundary Creek.

1.3 Identify impaired stream channel and riparian areas and implement tasks to restore their appropriate functions.

1.3.1 Conduct watershed problem assessments. Identify site-specific threats (problem assessment) that may be limiting bull trout in watersheds not already evaluated. Examples include **Idaho:** Boundary Creek (Idaho and British Columbia), Callahan Creek (Idaho and Montana), Deep Creek, and Moyie River; **Montana:** Fortine Creek (thermal); Blue Sky, Clarence, and Lewis creeks in the Grave Creek drainage; North Fork Keeler Creek and O'Brien Creek

1.3.2 Revegetate denuded riparian areas. Revegetate to restore shade and canopy, riparian cover, and native vegetation in streams where investigation indicates such actions are likely to benefit native fish. Priority watersheds may include **Idaho:** Boundary Creek (Idaho and British Columbia), Deep Creek, Kootenai River, Long Canyon Creek, Parker Creek, and Trout Creek;

Montana: Callahan Creek, Fisher River, Libby Creek, O'Brien Creek, Pipe Creek, and Quartz Creek.

1.3.3 Improve grazing practices. Reduce negative effects of grazing with improved grazing management or riparian fencing where investigation indicates such actions are likely to benefit native fish. Priority watersheds may include **Idaho:** Boundary Creek (Idaho and British Columbia), Deep Creek, Long Canyon Creek, Parker Creek, and Trout Creek; **Montana:** Grave Creek (lower drainage) and Libby Creek.

1.3.4 Restore stream channels. Conduct stream channel restoration activities where investigation indicates such actions are likely to benefit native fish. Priority watersheds may include **Idaho:** Boulder Creek, Boundary Creek (Idaho and British Columbia), Cow Creek, Katka Creek, Myrtle Creek, Parker Creek, and Smith Creek; **Montana:** Fisher River, Grave Creek, Libby Creek, and Pipe Creek.

1.3.5 Improve instream habitat. Increase or improve instream habitat by restoring recruitment of large woody debris, pool development, or other appropriate components in streams where investigation indicates such actions are likely to benefit native fish. Priority watersheds may include **Idaho:** Boundary Creek (Idaho and British Columbia), Deep Creek, Fisher Creek, Long Canyon Creek, Myrtle Creek, Parker Creek, Smith Creek, and Trout Creek; **Montana:** Fisher River, Pipe Creek, and Quartz Creek.

1.3.6 Minimize potential stream channel degradation. Ensure that negative effects to bull trout of ongoing flood control activities (*e.g.*, channel clearing on Libby, Pipe, and Quartz creeks in Montana and dredging) are minimized or eliminated.

1.4 Operate dams to minimize negative effects on bull trout.

1.4.1 Protect Lake Koocanusa habitat. Review Lake Koocanusa operational concerns (*e.g.*, water level manipulation) and support operating recommendations that provide enforceable drawdown limits and refill guidelines through Federal consultation (USFWS 2000). The VARQ flood-control model should be implemented by water managers to provide comprehensive, long-term, balanced, and predictable allocation of water resources from Lake Koocanusa that will limit the duration and frequency of deep reservoir drawdowns, improve reservoir refill probability, and produce a more naturally shaped dam discharge pattern downstream (USFWS 2000). Once implemented, these strategies must be evaluated to determine the effects on bull trout recovery.

1.4.2 Optimize outflow patterns from Libby Dam. Integrate reservoir operations with the extremely complex demands for downstream flow releases in a fashion that restores a more naturally shaped dam discharge pattern (both seasonally and daily) and accommodates sufficient instream flows for threatened and endangered fishes (bull trout, Kootenai River white sturgeon, and Kootenai River burbot [petitioned]). Emphasis should be placed on cooperation and communications between potentially conflicting missions and mandates of Federal agencies (*e.g.*, Bonneville Power Administration, Corps Of Engineers, U.S. Fish and Wildlife Service, and National Marine Fisheries Service).

1.4.3 Provide flushing flows. Encourage seasonal peak flows downstream of Libby Dam in at least some years, coordinated with Kootenai River white sturgeon recovery needs, that simulate natural conditions to physically maintain habitat (*i.e.*, prevent delta formation, which may cause migratory blockages

at the mouths of tributaries). Existing problems occur in **Idaho:** Caboose, Star, and Debt creeks; **Montana:** Callahan, Libby, O'Brien, Pipe, and Quartz creeks.

1.4.4 Avoid gas supersaturation. Manage spill at Libby Dam to minimize gas supersaturation, which causes conditions detrimental to bull trout and other species.

1.4.5 Examine loss of connectivity of bull trout at Libby Dam. Evaluate the significance of bull trout that are isolated between Libby Dam and Kootenai Falls and the potential impact of the loss of connectivity due to Libby Dam to the health of bull trout populations in the system.

1.4.6 Monitor kokanee entrainment through Libby Dam. Continue monitoring kokanee entrainment through Libby Dam and assess the potential importance of this supplemental food source for downstream bull trout.

1.5 Identify upland conditions negatively affecting bull trout habitats and implement tasks to restore appropriate functions.

1.5.1 Monitor and mitigate fire effects, where necessary. Monitor effects from wild fires and pursue habitat restoration actions where warranted.

2 Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.

2.1 Develop, implement, and enforce public and private fish stocking policies to reduce stocking of nonnative fishes that affect bull trout.

2.1.1 Upgrade fish hatchery practices. Evaluate all fish stocking programs and private and public hatchery practices to minimize

the risk of further inadvertent introduction of nonnative species to the Kootenai River drainage.

2.1.2 Prevent introductions of nonnative fishes from private fish ponds. Reduce threat of inadvertent introduction from private fish ponds by closely regulating existing permits (*e.g.*, Therriault, Deep, and Grave creeks) and by screening future applications.

2.2 Evaluate policies for preventing illegal transport and introduction of nonnative fishes.

2.3 Provide information to the public about ecosystem concerns of illegal introductions of nonnative fishes.

2.3.1 Discourage unauthorized fish introductions. Implement educational effort about the problems and consequences of unauthorized fish introductions. Continue assessment of predator and prey interactions in Lake Koocanusa and Kootenay Lake with emphasis on preventing illegal introductions of lake trout, walleye, brown trout, or other competing piscivores from nearby waters.

2.4 Evaluate biological, economic, and social effects of control of nonnative fishes.

2.5 Develop tasks to reduce negative effects of nonnative taxa on bull trout.

2.6 Implement control of nonnative fishes where found to be feasible and appropriate.

2.6.1 Experimentally remove established brook trout populations. Evaluate opportunities for removing brook trout from selected streams and lakes. Priority watersheds include **Idaho:** Boulder

Creek, Deep Creek, and Perkins Lake; **Montana:** Grave Creek (drainage wide), O'Brien Creek, and Pipe Creek (Loon Lake).

3 Establish fisheries management goals and objectives compatible with bull trout recovery and implement practices to achieve goals.

3.1 Develop and implement State and Tribal native fish management plans integrating adaptive research.

3.2 Evaluate and prevent overharvest and incidental angling mortality of bull trout.

3.2.1 Minimize unintentional bull trout mortality. Ensure that sport angling regulations and fisheries management plans, guidelines, and policies minimize unintentional mortality of bull trout in Lake Koocanusa, the Kootenai River, and tributaries.

3.2.2 Ensure compliance with angling regulations and oversee scientific research. Ensure compliance with angling regulations and scientific collection policies and target bull trout spawning and staging areas for enforcement.

3.2.3 Implement angler education efforts. Continue to provide information to anglers about bull trout identification, special regulations, and reducing hooking mortality for bull trout caught incidentally in Lake Koocanusa and the Kootenai River watershed.

3.2.4 Solicit information from commercial guides. Develop a reporting system to collect information on bull trout caught and released by commercial fishing guides on the Kootenai River.

3.2.5 Coordinate with British Columbia. Continue close communication with British Columbia Ministry of Water, Land,

and Air Protection to carefully monitor the potential effects of tightly regulated bull trout harvest (currently documented to be low) in British Columbia waters (lower Elk River, Lake Koocanusa, and Kootenay Lake) on recovery in the United States.

3.3 Evaluate potential effects of introduced fishes and associated sport fisheries on bull trout recovery and implement tasks to minimize negative effects on bull trout.

3.3.1 Evaluate site-specific conflicts with introduced sport fish. Determine site-specific level of predation and competition of bull trout with introduced sport fish and assess effects of those interactions, especially with Kamloops rainbow trout in Lake Koocanusa and largemouth bass in Bull Lake. To protect westslope cutthroat genetic purity, managers have stopped stocking rainbow trout directly into the Lake Koocanusa watershed and have agreed that any further rainbow trout plants should use sterile fish.

3.4 Evaluate effects of existing and proposed sport fishing regulations on bull trout.

3.4.1 Evaluate opportunities for regulated bull trout fisheries. Evaluate management proposals to allow carefully regulated harvest of bull trout (in Lake Koocanusa or other waters) where monitoring of the population status provides a clear record that a harvestable surplus can be maintained and that such harvest will benefit, or at least not be detrimental to, recovery goals. If allowable harvest levels can be implemented, additional sport-fishing support can be solicited for recovery goals, as well as aid for implementing other recovery tasks.

4 Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout.

4.1 Incorporate conservation of genetic and phenotypic attributes of bull trout into recovery and management plans.

4.1.1 Conduct genetic inventory. To contribute to establishing a program to understand the genetic baseline and to monitor genetic changes throughout the range of bull trout (see Chapter 1 narrative), continue coordinated genetic inventory throughout recovery unit, emphasizing origin of bull trout captured from the mainstem Kootenai River between Libby Dam and Kootenay Lake.

4.1.2 Maintain long-term viability. Manage local populations (numbers and life forms) to maintain long-term viability.

4.2 Maintain existing opportunities for gene flow among bull trout populations.

4.2.1 Maintain connectivity with British Columbia. Emphasize the importance of connectivity of the British Columbia populations (spawning in British Columbia supports Lake Koocanusa, and Kootenay Lake is essential to the Kootenai River stocks) and the important factors related to maintaining that connectivity across the international border.

4.3 Develop genetic management plans and guidelines for appropriate use of transplantation and artificial propagation.

5 Conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach that uses feedback from implemented, site-specific recovery tasks.

5.1 Design and implement a standardized monitoring program to assess the effectiveness of recovery efforts affecting bull trout and their habitats.

5.2 Conduct research evaluating relationships among bull trout distribution and abundance, bull trout habitat, and recovery tasks.

5.2.1 Delineate important migratory habitat. Determine movement and seasonality of use of different habitat types by adult and subadult migratory bull trout, with emphasis on the mainstem Kootenai River and Kootenay Lake.

5.2.2 Research the link between system productivity and bull trout abundance. Evaluate the effects of the nutrient sink, caused by Lake Koocanusa, on the downstream system. Monitor British Columbia efforts to restore productivity to Kootenay Lake via artificial fertilization. Emphasis should be placed on continuing to track bull trout population trends through surveys of catch and harvest in Kootenay Lake as well as other monitoring indices (*e.g.*, redd counts) of migratory fish in the upstream waters.

5.2.3 Evaluate temperature as a limiting factor. Evaluate the potential role of seasonally elevated water temperatures as a limiting factor to juvenile bull trout rearing and/or adult migration in **Idaho:** Boundary Creek (Idaho and British Columbia) and Deep Creek, Long Canyon Creek, Myrtle Creek, Parker Creek, Smith Creek, and Trout Creek; and **Montana:** Fisher River, Fortine Creek, Libby Creek, and Tobacco River.

5.2.4 Evaluate habitat-limiting factors for Bull and Sophie Lake core areas. Evaluate the isolated adfluvial bull trout populations in Sophie Lake and Bull Lake to quantify the population numbers, trends, and extent of habitat used, as well as the potential limiting factors.

5.2.5 Assess restoration potential. Evaluate the potential for restoring habitat in Kootenai River tributaries that have been channelized.

5.2.6 Identify suitable unoccupied habitat. Identify suitable unoccupied habitat, if any. Within 5 years, complete a comprehensive list of all known passage barriers blocking access to suitable habitat by upstream migrating bull trout.

5.3 Conduct evaluations of the adequacy and effectiveness of current and past best management practices in maintaining or achieving habitat conditions conducive to bull trout recovery.

5.4 Evaluate effects of diseases and parasites on bull trout and develop and implement strategies to minimize negative effects.

5.5 Develop and conduct research and monitoring studies to improve information concerning the distribution and status of bull trout.

5.5.1 Research historical distribution and abundance. Additional information is needed on the historical distribution and abundance of bull trout in this drainage, particularly in the Idaho portions of the watershed. Such research will be useful in helping direct recovery actions.

5.5.2 Map spawning habitat. Develop a comprehensive map of primary bull trout tributary spawning reaches for focusing habitat protection and recovery efforts.

5.5.3 Research populations in Bull Lake and Sophie Lake. Evaluate the isolated adfluvial bull trout populations in Sophie and Bull lakes to determine core area status and critical limiting factors, to provide recovery actions, and to establish genetic background.

5.6 Identify evaluations needed to improve understanding of relationships among genetic characteristics, phenotypic traits, and local populations of bull trout.

6 Use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats.

6.1 Use partnerships and collaborative processes to protect, maintain, and restore functioning core areas for bull trout.

6.1.1 Support watershed group restoration efforts. Support collaborative efforts by local watershed groups already established in Montana and Idaho (*e.g.*, Kootenai River Network) to accomplish site-specific protection and restoration activities consistent with this recovery plan.

6.1.2 Protect habitat. Provide long-term habitat protection through purchase, conservation easements, landowner incentives, management plans, and other means. Current emphasis is on **Montana:** Fisher River, Grave Creek, and Libby Creek.

6.2 Use existing Federal authorities to conserve and restore bull trout.

6.2.1 Monitor compliance with the Biological Opinion on Federal Columbia River Power System. Monitor compliance with the U.S. Fish and Wildlife Service's Biological Opinion on the Federal Columbia River Power System relative to operation of Libby Dam.

6.2.2 Implement Plum Creek Habitat Conservation Plan. Carry out compliance monitoring and a U.S. Fish and Wildlife Service commitment to adaptive management planning under the Plum Creek Native Fish Habitat Conservation Plan, especially in the Fisher River, Pipe Creek, and O'Brien Creek watersheds (Montana).

6.2.3 Coordinate all recovery actions with appropriate British Columbia partners. The Province of British Columbia has jurisdiction over most of the spawning and rearing habitat and for much of the foraging, migrating, and overwintering habitat for bull trout in this recovery unit. Coordinating land, water, and fisheries management activities between our two countries is crucial.

6.2.4 Ensure coordination of Endangered Species Act recovery implementation. Ensure that recovery actions for other listed species (*e.g.*, salmon and Kootenai white sturgeon) are not detrimental to recovery of bull trout. Ensuring that other recovery actions are not detrimental is particularly problematic in the allocation and timing of flow releases from Federal water projects.

6.3 Enforce existing Federal and State habitat protection standards and regulations and evaluate their effectiveness for bull trout conservation.

6.3.1 Fully implement State habitat protection laws. Fully implement the Montana Streamside Management Zone Law (1993), Montana Stream Protection Act (1965), Montana Natural Streambed and Land Preservation Act (1975), Idaho Forest Practices Act (1974), Idaho Stream Channel Protection Act (1967), Idaho Lake Protection Act (1973), and Idaho Code 36-906 addressing fish passage (pre-1900) to maximize legal protection of bull trout habitat under State law and evaluate the effectiveness of these Acts in conserving bull trout habitat.

6.3.2 Encourage floodplain protection. Encourage local governments to develop, implement, and promote restrictive floodplain regulations to mitigate extensive habitat loss and stream encroachment from rural residential development throughout the Kootenai River drainage. Development exacerbates temperature problems, increases nutrient loads, decreases bank stability, alters

instream and riparian habitat, and changes hydrologic response of affected watersheds.

7 *Assess the implementation of bull trout recovery by recovery units and revise recovery unit plans based on evaluations.*